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PASTOR, BEHLING & WHEELER, LLC
2201 Double Creek Drive, Suite 4004
Round Rock, TX 78664

Tel (512) 671-3434
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November 30, 2007
(PBW Project No. 1352)

VIA OVERNIGHT DELIVERY

Mr. Gary Miller, Remedial Project Manager
U.S. Environmental Protection Agency, Region 6
Superfund Division (6SF-AP)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

FINAL
(INCLUDES MODIFICATIONS)

Re: Phase 2 Groundwater Data, Gulfco Marine Maintenance Site, Freeport, Texas

Dear Mr. Miller:

Per previous discussions, this letter summarizes Phase 2 groundwater data collected as part of the Remedial Investigation/Feasibility Study (RI/FS) at the subject site (the Site), and proposes additional groundwater investigation activities to be performed on the basis of those data. This information is provided by Pastor, Behling & Wheeler, LLC (PBW) on behalf of LDL Coastal Limited LP (LDL), Chromalloy American Corporation (Chromalloy) and The Dow Chemical Company (Dow). In accordance with Paragraph 52 of the modified Unilateral Administrative Order for the Site, I certify that I have been fully authorized by the Respondents to submit these documents and to legally bind all Respondents thereto.

This letter includes the modifications requested by the United States Environmental Protection Agency (EPA) in a letter dated November 8, 2007, which approved (with modifications) the original version of this letter submitted on October 12, 2007.

PHASE 2 GROUNDWATER DATA SUMMARY

Phase 2 groundwater investigation activities were proposed in a January 19, 2007 letter to you and were approved (with modifications) by your letter dated March 1, 2007. Phase 2 field activities, which were performed during the period from May through September 2007, included the following:

- Installation, development and sampling of six monitoring wells (NB4MW18, NG3MW19, OMW20, OMW21, NC2MW28, and ND3MW29) within the Zone A water-bearing unit in the area north of Marlin Avenue (the North Area), as shown on Figure 1;
- Installation, development and sampling of one monitoring well (SA4MW22) within the Zone A water-bearing unit in the area south of Marlin Avenue (the South Area);
- Installation, development and sampling of three monitoring wells (ND4MW24B, NG3MW25B, and OMW27B) within the Zone B water-bearing unit in the North Area;
- Drilling and continuous sampling (for lithologic and headspace screening purposes) of two soil borings (NC2B23B and OB26B) to a depth of 40 feet in the North Area (installation of Zone B monitoring wells was originally planned for these borings;



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however, as discussed with you at the time of drilling, the Zone B water-bearing unit was not encountered at these locations and thus monitoring wells were not installed;

- Sampling of existing South Area monitoring wells SF5MW10 and SJ1MW15;
- Collection of a soil sample at boring location ND3MW29 from the depth interval where a sheen indicating the presence of a non-aqueous phase liquid (NAPL) was observed within the soil core;
- Evaluation of the possible presence of NAPL within monitoring wells; and
- Measurement of water levels in Site monitoring wells and staff gauges.

Evaluations for the possible presence of NAPL in monitoring wells were performed on June 6, 2007 and September 6, 2007. The presence of NAPL was not identified in any monitoring well during those evaluations. Water-level elevations were also measured on these dates. These elevation data were used to construct the potentiometric surface maps for Zone A (Figures 2 and 3) and Zone B (Figures 4 and 5). The Zone A potentiometric maps indicate groundwater flow conditions similar to those observed during previous water-level measurement events. In Zone A, a potentiometric mound is present in the area south of the former surface impoundments with flow generally toward the northwest in the area north of this mound, and flow generally to the south or southeast in the area south of this mound. The Zone B potentiometric maps suggest an easterly groundwater flow direction.

The proposed analytical suite for samples collected as part of the Phase 2 groundwater investigation varied by location based on the Phase 1 groundwater data and was specified in the aforementioned January 19 and March 1, 2007 letters. Results of these analyses are summarized below. Laboratory reports, validation reports and the project database containing these results have been previously provided as part of the monthly status reports for the Site.

The soil sample from the boring for ND3MW29 (sample ID of SBMW29-01) was analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and pesticides. Compounds detected in this sample are listed in Table 1. The complete set of analytical results is included on the DVD included with this letter.

Section 5.6.5 of the RI/FS Work Plan (the Work Plan) outlines procedures for evaluating the extent of chemicals of interest (COIs) in Site groundwater. Specifically, the groundwater sample analytical results are compared to the Preliminary Screening Values (PSVs) in Table 18 of the Work Plan for the purpose of assessing whether the lateral and vertical extent of COIs has been identified. Comparisons to the Table 18 PSVs are based on the condition that the groundwater unit being evaluated satisfies TCEQ criteria for a Class 3 groundwater bearing unit. The total dissolved solids (TDS) concentrations in groundwater samples from Zone A (39,800 mg/L in the well ND3MW02 sample) and Zone B (34,500 mg/L in the well NG3MW25B sample) meet the Class 3 criterion of a TDS concentration greater than 10,000 mg/L, thus satisfying the condition for use of Table 18 PSVs for these units.

Table 2 lists detected Phase 2 groundwater concentrations exceeding their respective PSVs. As indicated therein, Phase 2 exceedences were limited to two Zone A wells: (1) five VOCs and two pesticide compounds in the ND3MW29 sample; and (2) one pesticide in the well SF5MW10 sample. Due to sample dilutions necessitated by the relatively high concentrations of the detected VOCs in the ND3MW29 sample, the sample quantitation limits (SQLs) for many VOC analytes in this sample were higher than their respective PSVs. Consequently, it is possible that other VOCs may be present at concentrations in ND3MW29 exceeding their PSVs.

Detected Phase 2 groundwater concentrations exceeding their respective PSVs are also plotted on Figure 6. As shown on this figure, the Phase 2 PSV exceedences are associated with monitoring wells located in the Site interior. Based on the absence of PSV exceedences in groundwater samples from perimeter monitoring wells NB4MW18, NG3MW19, NC2MW28, OMW20, OMW21, SA4MW22, SJ1MW15, SJ7MW16, and SL8MW17 (see Figure 7), it is concluded that the lateral extent of COIs in Zone A groundwater has been identified and no additional Zone A monitoring wells are proposed.

The only COIs detected in Zone B were five VOCs in the ND4MW24B sample. As shown in Table 3, the concentrations of these VOCs were well below their respective PSVs. Based on these data and the absence of Zone B at boring locations NC2B23B and OB26B, it is concluded that the lateral extent of COIs in Zone B groundwater has been identified. Consistent with discussions in the January 19, 2007 letter and as detailed below, an additional Zone B monitoring well is proposed in closer proximity to the former surface impoundments to confirm that the vertical extent of COIs in groundwater has been identified.

PROPOSED PHASE 3 GROUNDWATER INVESTIGATION ACTIVITIES

Proposed Zone B Well

The January 19, 2007 letter proposing Phase 2 groundwater activities included the following provision: "In the event that no PSV exceedences are noted in any of the proposed Zone B wells, an additional Zone B monitoring well will be installed closer to the former surface impoundments, where possible, to further evaluate the absence of PSV exceedences in this zone." In light of the absence of any Zone B PSV exceedences and consistent with this provision, one additional Zone B monitoring well (NE3MW30B) is proposed as shown on Figure 8. The proposed location is immediately downgradient (see Figures 4 and 5) of the area where the highest COI concentrations have been observed in Zone A groundwater.

The boring for the NE3MW30B will be advanced as necessary to identify the top and base of Zone B (anticipated total boring depth of approximately 30 to 35 feet below grade). The specific design for the well will be determined in the field based on the observed lithology with the goal of screening the well at the base of Zone B. The maximum well screen length will be 10 feet. If the Zone B sand is more than 10-feet thick, the screen will be set so that the most permeable sand intervals, based on visual assessment, are included, and any identified NAPL zones are included; but if the best sand intervals and any NAPL zones can not all be covered within the 10-foot screen, then the screen design will ensure that the NAPL zones are included. In order to minimize the potential for downward migration of COIs from Zone A to Zone B as a result of well installation activities, a surface or isolation casing will be installed to the confining clay below Zone A and grouted in place prior to deeper boring advancement and well construction. Should visual indications of chemical staining/sheens or dense NAPLs be observed within the recovered soil core for the surface casing boring for NE3MW30B, the proposed well will be relocated outside of the area where such conditions are encountered. After construction, NE3MW30B will be developed and sampled as described in the Work Plan and the Field Sampling Plan. The groundwater sample for this well will be analyzed for the parameters listed in Table 4.

Hydraulic Testing

Hydraulic testing will be performed on up to three monitoring wells from the uppermost water-bearing unit with the wells selected to represent the anticipated range of potential hydraulic conditions in the water-bearing unit as specified in Section 5.6.5.j of the Work Plan and to provide data from the area to the north (downgradient) of the former surface impoundments. With this objective, the Zone A wells proposed for hydraulic testing are ND4MW03, NE1MW04, and SJ1MW15. Boring logs for these wells are provided in Appendix A to this letter. Hydraulic testing and data analysis will be performed as described in Section 5.5.3 of the Field Sampling Plan (FSP).

Natural Attenuation Evaluation


Section 4.2 of the Work Plan includes collection of data necessary to evaluate natural process at the Site, including the natural attenuation of chlorinated solvents in groundwater through reductive dehalogenation processes. Phase 1 and 2 COI concentration data, most notably the presence of chlorinated solvent daughter products, such as cis-1,2-dichloroethene (cis-1,2-DCE) (daughter product of trichloroethene) indicate that reductive dehalogenation is occurring in Zone A groundwater. Other potential daughter products, such as trichloroethene (TCE) (daughter product of tetrachloroethene), 1,2-dichloroethane (1,2-DCA) (daughter product of 1,1,1-trichloroethane), and vinyl chloride (daughter product of DCE), may be present in Site groundwater as reductive dehalogenation products and/or as contaminant source materials. Other Phase 1 and 2 groundwater data, such as very low dissolved oxygen concentrations, provide secondary lines of evidence for reductive dehalogenation by demonstrating that reducing conditions conducive to these processes are present in the Zone A groundwater zone.

In order to more fully evaluate natural attenuation trends at the Site and thus assess the appropriateness of these processes as part of a final remedy for Site groundwater, additional monitoring of selected Zone A wells in the vicinity of the former surface impoundments is proposed. As summarized in Table 4, the proposed natural attenuation evaluation includes sampling ten wells for VOCs and selected natural attenuation screening parameters. Details regarding sample handling, and analytical methods for the proposed screening parameters are provided in Appendix B. To help facilitate an evaluation of temporal concentration trends, it is proposed that sampling of these nine wells be performed once during the fourth quarter 2007 and once during the first quarter 2008. Consistent with the Quality Assurance Project Plan (QAPP) procedures for data to be used for site characterization and alternatives evaluation purposes, validation of these laboratory data will be performed at data review Level II.

Thank you for the opportunity to submit this information. Based on your approval of the previous version of this letter submitted on October 12, 2007, we are in the process of performing the sampling activities described herein and have initiated the indicated sample analyses.

Sincerely,

PASTOR, BEHLING & WHEELER, LLC



Eric F. Pastor, P.E.
Principal Engineer

Mr. Gary Miller
November 30, 2007
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cc: Ms. Luda Voskov - Texas Commission on Environmental Quality
Mr. Robert L. Iuliucci - Sequa Corporation
Mr. Brent Murray - Environmental Quality, Inc.
Mr. Rob Rouse - The Dow Chemical Company
Mr. Donnie Belote - The Dow Chemical Company
Mr. Allen Daniels - LDL Coastal Limited, LP
Mr. F. William Mahley - Strasburger & Price, LLP
Mr. James C. Morris III - Thompson & Knight, LLP
Ms. Elizabeth Webb - Thompson & Knight, LLP

TABLES

**Table 1 - Detected Concentrations
in SBMW29-01 Soil Sample**

Chemical of Interest	Concentration (mg/kg)
1,1,1-Trichloroethane	3,750
1,1-Dichloroethane	67.3J
1,1-Dichloroethene	128J
1,2,3-Trichloropropane	471
1,2-Dichloroethane	595
Benzene	84.3J
Benzo(b)fluoranthene	0.017J
Fluoranthene	0.03J
Fluorene	0.013J
Fluorene	0.013J
Isopropylbenzene (Cumene)	93.7J
Methylene chloride	1,130
Naphthalene	102J
Phenanthrene	0.057J
Tetrachloroethene	4,340
Toluene	108J
Trichloroethene	2,150

Note:

(1) Data Qualifier: J = estimated value.

**Table 2 - Detected Phase 2 Groundwater Concentrations
Exceeding Preliminary Screening Values**

Sample Location	Water-Bearing Unit	Chemical of Interest	Concentration (mg/L)	Preliminary Screening Value (mg/L) ¹
ND3MW29	Zone A	1,1,1-Trichloroethane	156	3.1
ND3MW29	Zone A	1,2,3-Trichloropropane	44.3J	0.0292
ND3MW29	Zone A	1,2-Dichloroethane	328	0.5
ND3MW29	Zone A	Endosulfan II	0.00012J	0.000009
ND3MW29	Zone A	gamma-BHC (Lindane)	0.00153	0.000016
ND3MW29	Zone A	Methylene chloride	1,230	0.5
ND3MW29	Zone A	Trichloroethene	61.2J	0.5
SF5MW10	Zone A	gamma-BHC (Lindane)	0.000042J	0.000016

Notes:

(1) Preliminary Screening Value from Table 18 of RI/FS Workplan.

(2) Data qualifier: J = estimated value.

Table 3 - Detected Zone B Groundwater Concentrations

Sample Location	Chemical of Interest	Concentration (mg/L)	Preliminary Screening Value (mg/L) ¹
ND4MW24B	1,2-Dichloroethane	0.00157J	0.5
ND4MW24B	cis-1,2-Dichloroethene	0.00431J	7.0
ND4MW24B	Methylene chloride	0.00437J	0.5
ND4MW24B	Tetrachloroethene	0.000881J	0.5
ND4MW24B	Trichloroethene	0.00203J	0.5

Notes:

(1) Preliminary Screening Value from Table 18 of RI/FS Workplan.

(2) Data qualifier: J=estimated value.

Table 4 - Proposed Sample Analyses

Sample Location	Analytical Parameter
NE3MW30B	1,1,1-Trichloroethane 1,1-Dichloroethene 1,2,3-Trichloropropane 1,2-Dichloroethane 1,2-Dichloropropane Benzene Carbon tetrachloride cis-1,2-Dichloroethene Ethylbenzene Methylene chloride Tetrachloroethene Toluene Trichloroethene Vinyl chloride Anthracene Naphthalene Phenanthrene Pyrene Nickel Thallium
ND2MW01	VOCs ⁽¹⁾
ND2MW02	Methane (dissolved) ⁽²⁾
ND4MW03	Ethane, ethene (dissolved) ⁽²⁾
NE1MW04	Nitrate ⁽²⁾
NE3MW05	Sulfide ⁽²⁾
NF2MW06	Sulfate
ND3MW29	Total Organic Carbon ⁽²⁾
OMW20	Dissolved oxygen ⁽³⁾
OMW21	Oxidation reduction potential ⁽³⁾
NC2MW28	pH ⁽³⁾ Temperature ⁽³⁾ Alkalinity ⁽³⁾ Iron II ⁽⁴⁾

Notes:

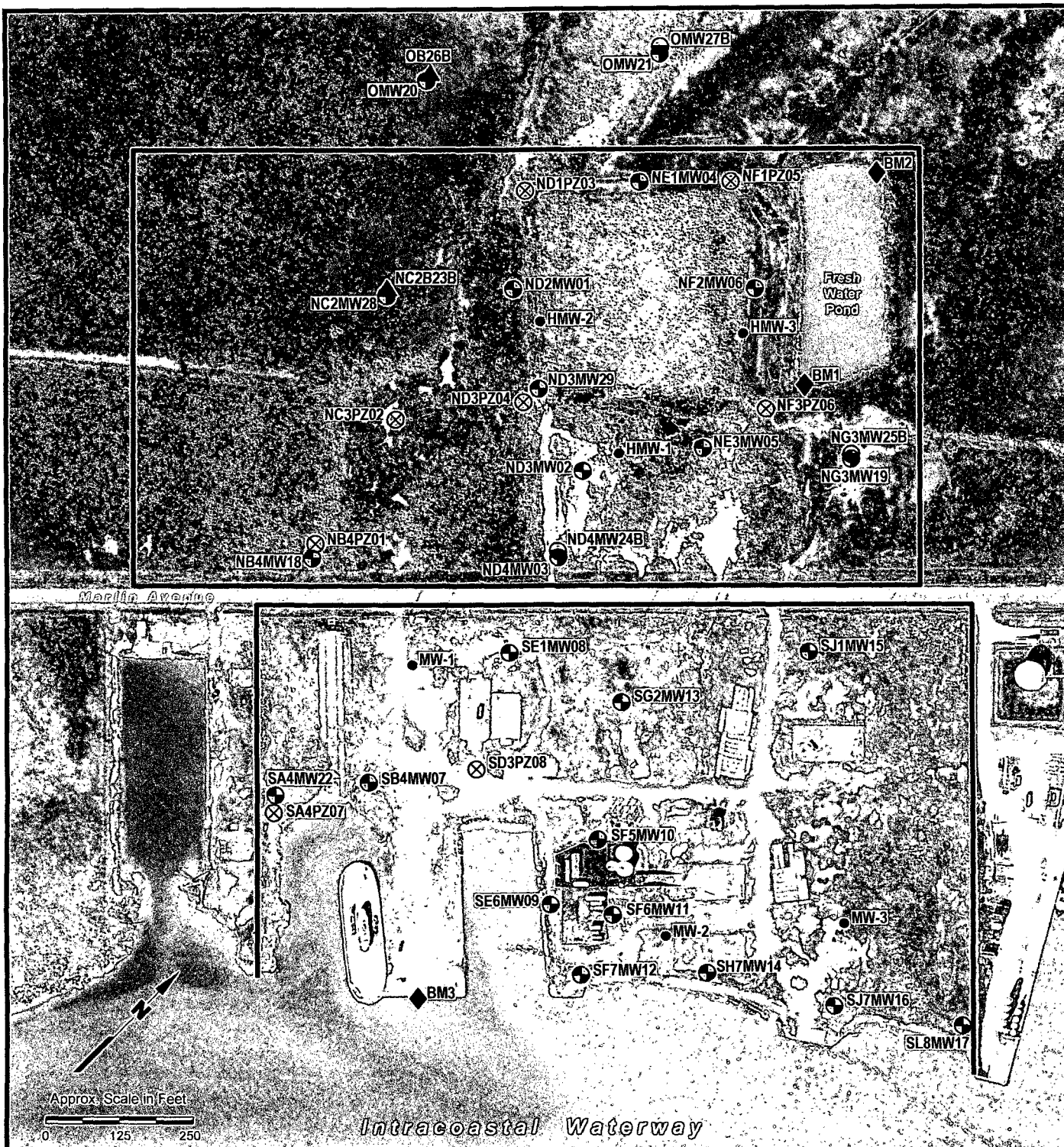
(1) All VOCs listed in Table B-2 of Field Sampling Plan.

(2) See Appendix B to this letter for sampling considerations and analytical method.

(3) Field measurement.

(4) Field analysis by Hach Method 8146

FIGURES



EXPLANATION

- | | |
|---|-------------------------------------|
| — Gulfco Marine Maintenance Site Boundary (approximate) | ● Monitoring Well Location - Zone B |
| ● Monitoring Well Location - Zone A | ▲ Soil Boring Location - Zone B |
| ⊗ Temporary Piezometer - Zone A | ● Previous Monitoring Well Location |
| ◆ Staff Gauge | |

Source of photo: H-GAC, Texas aerial photograph, 2004.

GULFCO MARINE MAINTENANCE FREEPORT, BRAZORIA COUNTY, TEXAS

Figure 1

MONITORING WELL LOCATIONS

PROJECT: 1352

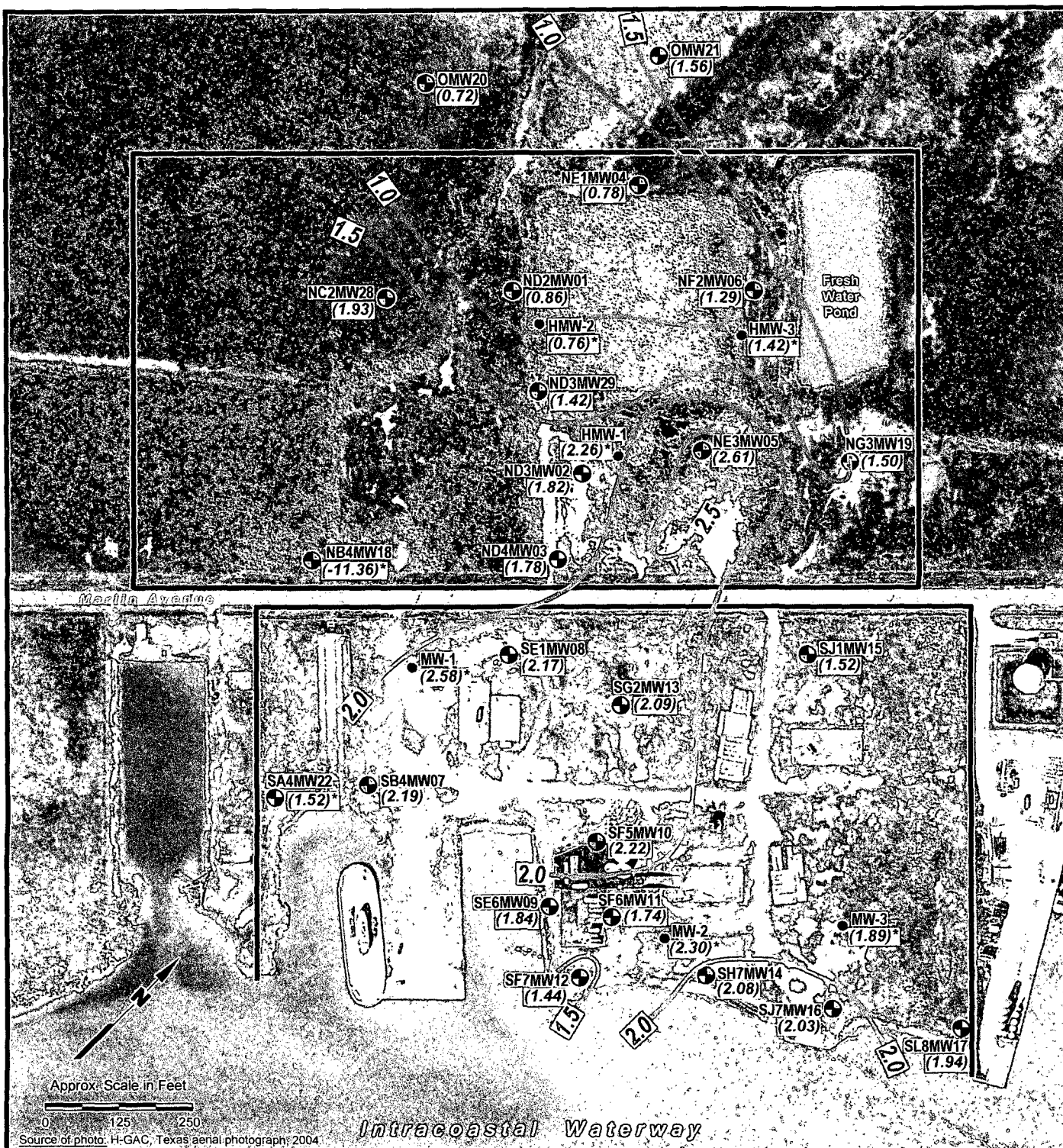
BY: ZGK

REVISIONS

DATE: NOV., 2007

CHECKED: EFP

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GULFCO MARINE MAINTENANCE
FREEPORT, BRAZORIA COUNTY, TEXAS

Figure 2
PRELIMINARY ZONE A
POTENTIOMETRIC SURFACE
JUNE 6, 2007

PROJECT: 1352

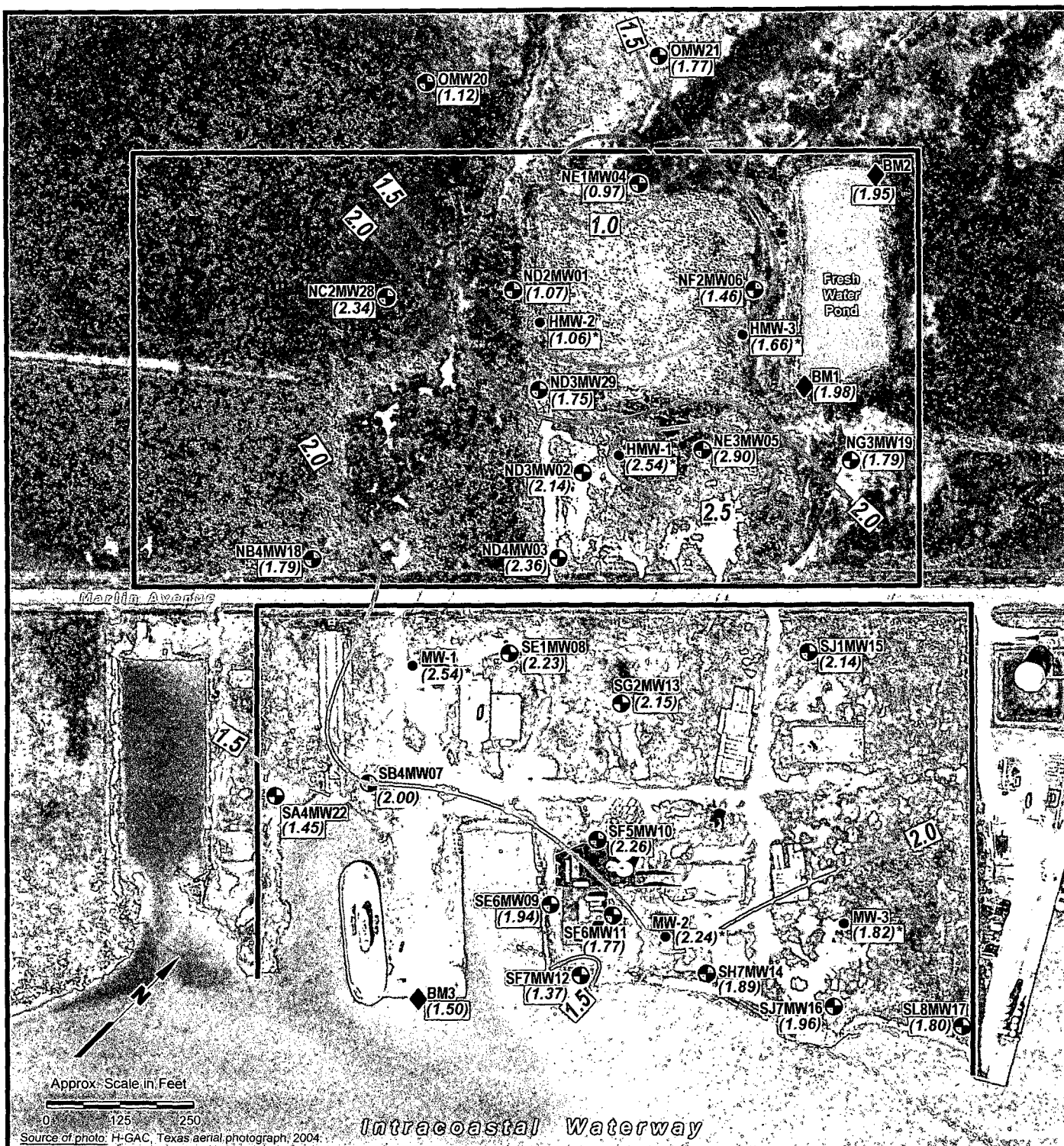
BY: ZGK

REVISIONS

DATE: NOV., 2007

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**GULFCO MARINE MAINTENANCE
FREEPORT, BRAZORIA COUNTY, TEXAS**

Figure 3

**PRELIMINARY ZONE A
POTENTIOMETRIC SURFACE
SEPTEMBER 6, 2007**

PROJECT: 1352

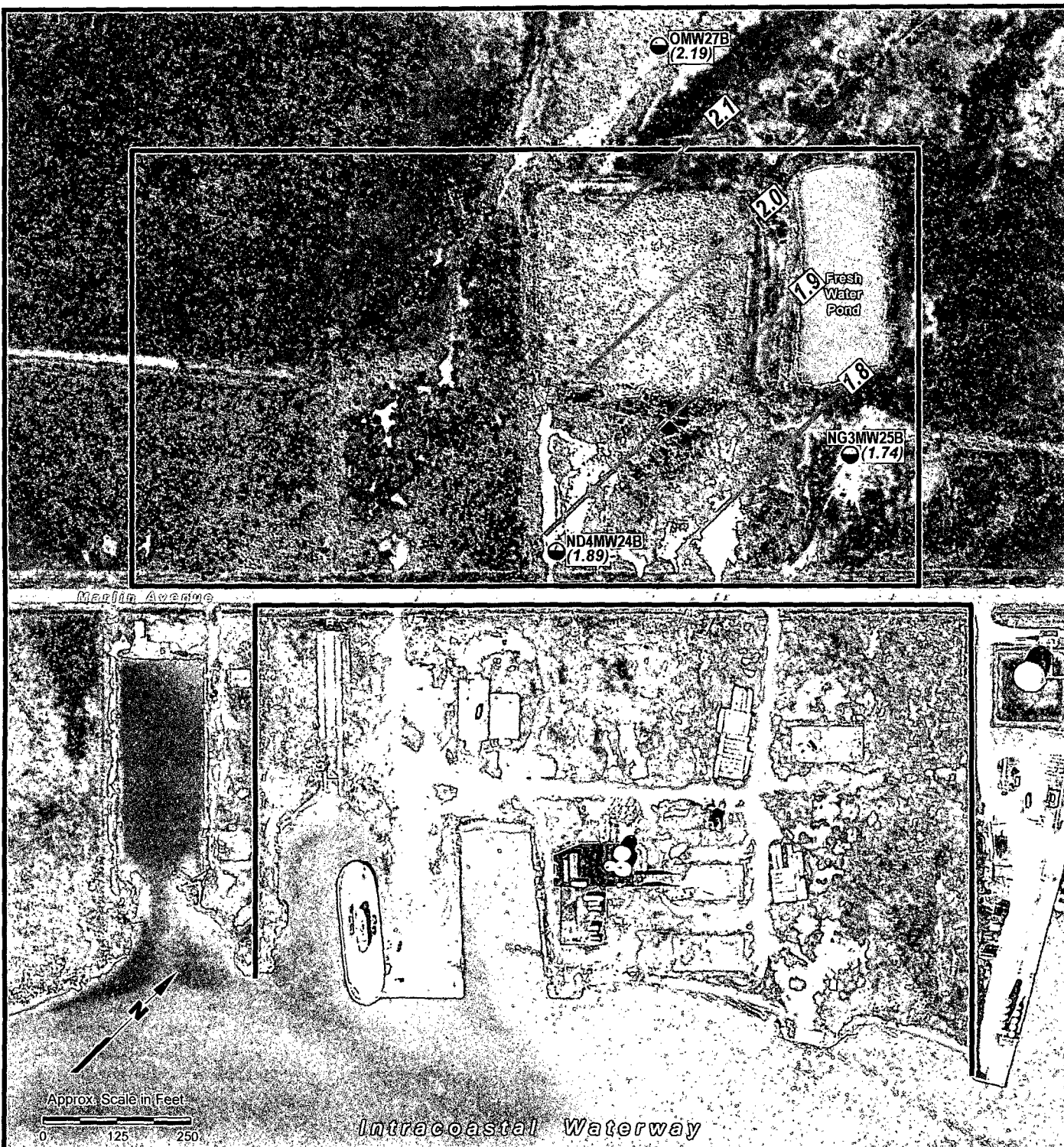
BY: ZGK

REVISIONS

DATE: NOV., 2007

CHECKED: EFP

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EXPLANATION

- | | |
|---|--|
| — Gulfco Marine Maintenance Site Boundary (approximate) | (1.89) Water-Level Elevation (Ft AMSL) Measured 06/06/07 |
| ● Monitoring Well Location - Zone B | ≡2.0≡ Potentiometric Surface Contour (Ft AMSL) Contour Interval = 0.1 Ft |

Source of photo: H-GAC, Texas aerial photograph, 2004.

GULFCO MARINE MAINTENANCE FREEPORT, BRAZORIA COUNTY, TEXAS

Figure 4

PRELIMINARY ZONE B POTENTIOMETRIC SURFACE JUNE 6, 2007

PROJECT: 1352

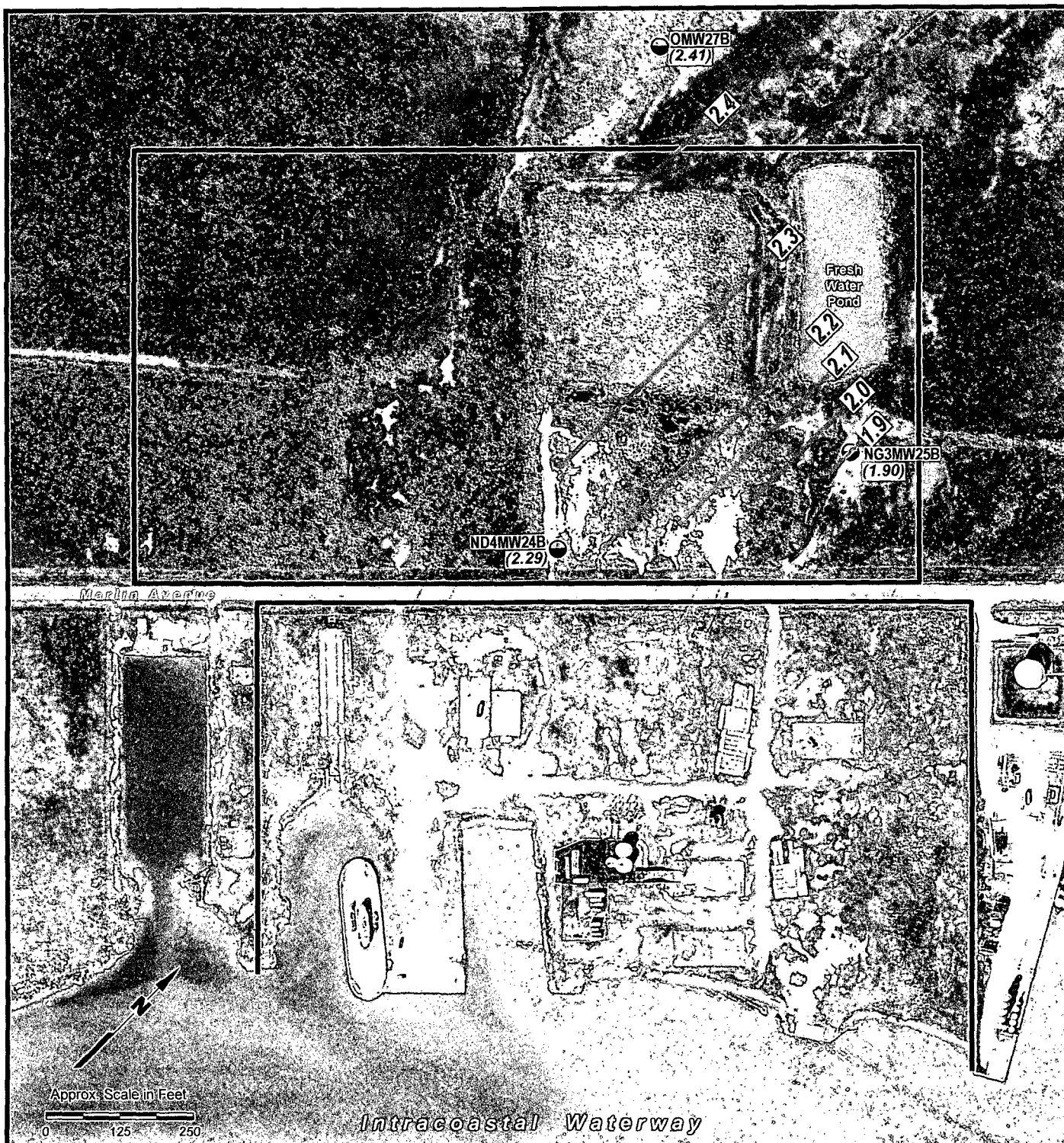
BY: ZGK

REVISIONS

DATE: NOV., 2007

CHECKED: EFP

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EXPLANATION

- | | |
|---|--|
| — Gulfco Marine Maintenance Site Boundary (approximate) | (2.29) Water-Level Elevation (Ft AMSL) Measured 09/06/07 |
| ● Monitoring Well Location - Zone B | ≡2.0≡ Potentiometric Surface Contour (Ft AMSL) Contour Interval = 0.1 Ft |

Source of photo: H-GAC, Texas aerial photograph, 2004.

GULFCO MARINE MAINTENANCE
FREEPORT, BRAZORIA COUNTY, TEXAS

Figure 5

PRELIMINARY ZONE B POTENTIOMETRIC SURFACE SEPTEMBER 6, 2007

PROJECT: 1352

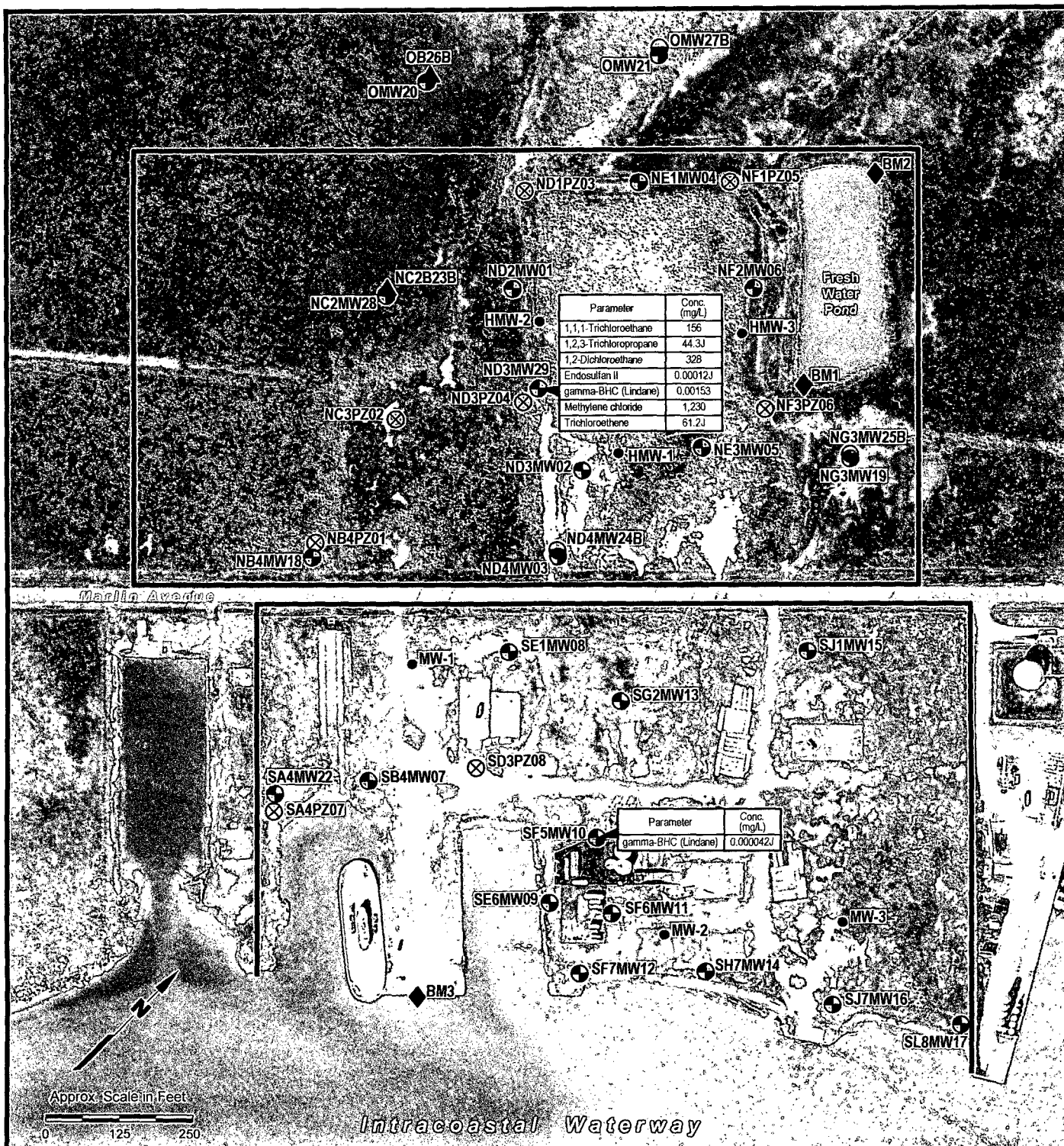
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EXPLANATION

- Gulfco Marine Maintenance Site Boundary (approximate)
- Monitoring Well Location - Zone A
- Temporary Piezometer - Zone A
- Staff Gauge
- Monitoring Well Location - Zone B
- Soil Boring Location - Zone B
- Previous Monitoring Well Location

Notes:

1. All samples collected June 2007.
2. Data Qualifiers: J = Estimated value.

Source of photo: H-GAC, Texas aerial photograph, 2004.

GULFCO MARINE MAINTENANCE FREEPORT, BRAZORIA COUNTY, TEXAS

Figure 6

DETECTED PHASE 2 GROUNDWATER SAMPLE CONCENTRATIONS EXCEEDING PSVS

PROJECT: 1352

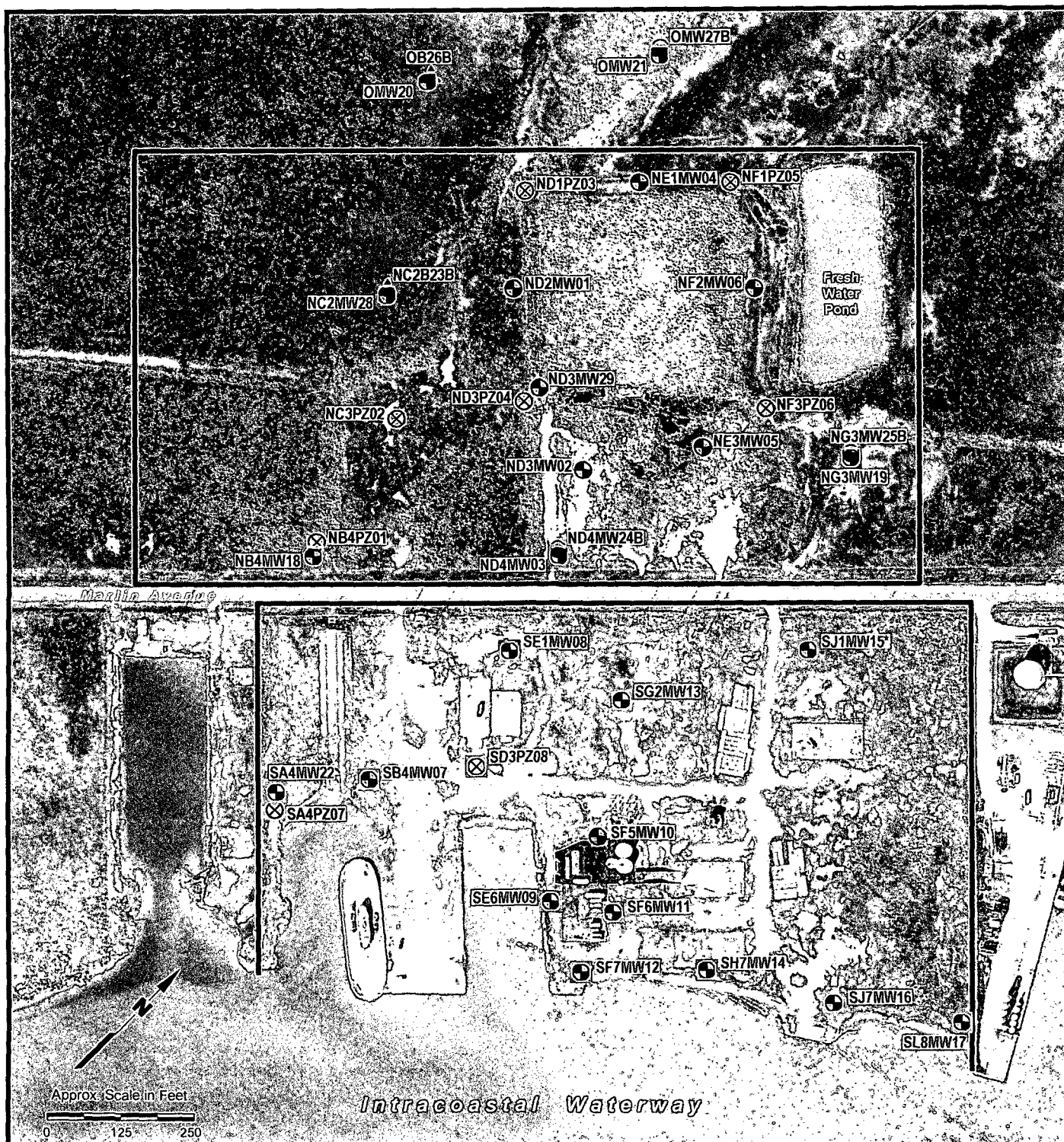
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EXPLANATION

- | | |
|--|-------------------------------------|
| — Gulfco Marine Maintenance Site Boundary (approximate) | ● Monitoring Well Location - Zone B |
| ⊙ Monitoring Well Location - Zone A | ▲ Soil Boring Location - Zone B |
| ⊗ Temporary Piezometer - Zone A | |
| □ Zone A Monitoring Well/ Temporary Piezometer with no Detections Above Preliminary Screening Values | |

Note:
 * The initial groundwater sample collected from SJ1MW15 contained Endosulfan sulfate and heptachlor epoxide at concentrations exceeding their PSVs; however, these exceedences were not confirmed in a second sample collected from the well.

GULFCO MARINE MAINTENANCE FREEPORT, BRAZORIA COUNTY, TEXAS

Figure 7

LATERAL EXTENT OF CHEMICALS OF INTEREST IN ZONE A

PROJECT: 1352

BY: ZGK

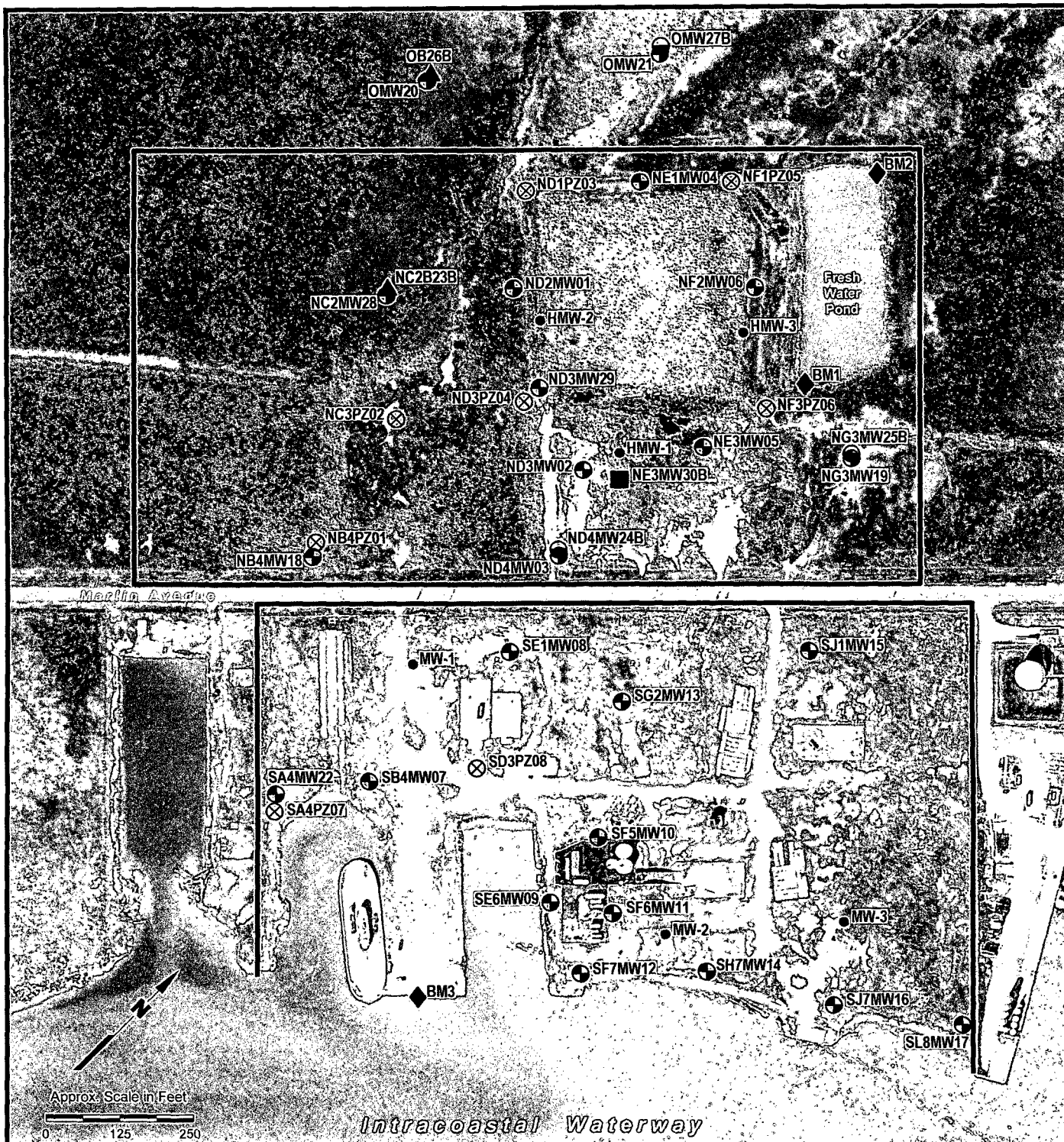
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DATE: NOV., 2007

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Source of photo: H-GAC, Texas aerial photograph, 2004.



EXPLANATION

- | | |
|---|--|
| — Gulfco Marine Maintenance Site Boundary (approximate) | ● Monitoring Well Location - Zone B |
| ⊕ Monitoring Well Location - Zone A | ▲ Soil Boring Location - Zone B |
| ⊗ Temporary Piezometer - Zone A | ● Previous Monitoring Well Location |
| ◆ Staff Gauge | ■ Proposed Zone B Monitoring Well Location |

Source of photo: H-GAC, Texas aerial photograph, 2004.

GULFCO MARINE MAINTENANCE FREEPORT, BRAZORIA COUNTY, TEXAS

Figure 8

PROPOSED MONITORING WELL LOCATION

PROJECT: 1352

BY: ZGK

REVISIONS

DATE: NOV., 2007

CHECKED: EFP

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APPENDIX A
BORING LOGS FOR PROPOSED HYDRAULIC TESTING WELLS

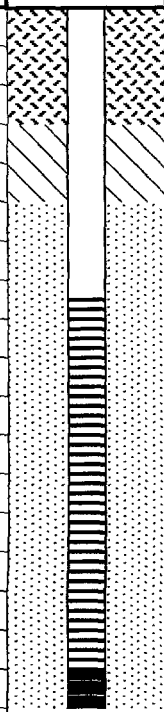
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Log of Boring: ND4MW03

Gulfco Marine Maintenance
Superfund Site
Freeport, TX

Completion Date:	07/17/06	Borehole Diameter (in.):	8.25
Drilling Company:	Best Drilling Services, Inc.	Total Depth (ft):	20
Field Supervisor:	Tim Jennings, P.G.	Northing:	13554562.67
Drilling Method:	Hollow Stem Auger	Easting:	3154758.06
Sampling Method:	5 ft continuous core	Ground Elev. (ft. MSL):	3.2
		TOC Elev. (ft MSL)	6.2

PBW Project No. 1352

Depth (ft)	Well Construction Diagram	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0		0.9	0.5/0.5	CL	(0.0 to 0.2) Silty SAND, light brown, moist, very fine-grained sand, soft.
			1.5/1.5		(0.2 to 0.6) Sandy CLAY, dark brown, moist, ~ 20% very fine-grained sand, ~ 80% medium plasticity clay, slightly firm.
		1.6	5/5		(0.6 to 2.0) Sandy CLAY, dark brown, becomes black below 1.5.
5		1.9			(2.0 to 4.2) Sandy CLAY, locally black and dark reddish-brown, becomes highly plastic below ~ 3.0.
			5/5		(4.2 to 8.2) Sandy CLAY as above, reddish-brown, moist, wet below 5.9, with thin sand interbeds locally.
10		0.8		SP/SC	(8.2 to 10.4) Sandy CLAY, brown, wet, ~ 40 very fine-grained sand, ~ 60% highly plastic clay, soft.
		2.4	5/5		(10.4 to 15.6) Poorly graded SAND with clayey sand, brown, wet, ~80% fine-grained sand, ~ 20% high plasticity clay, very soft.
15		2.1		CL/SP	(15.6 to 17.0) Poorly graded SAND and sandy CLAY, brown, wet, ~50% very fine-grained sand, ~ 50% high plasticity clay, very soft.
		2.9	5/5		(17.0 to 20.0) Sandy CLAY, brown to grayish brown, wet, <5% fine-grained sand, ~95% high plasticity CLAY, soft, borehole allowed to slough to 18.0 for well construction.
20		3.4		CH	
25					
30					

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Well Materials

(0.0 to 7.5) Casing, 2" sch. 40 PVC
(7.5 to 17.5) Screen, 2" sch. 40 PVC, 0.01 slot
(17.5 to 18.0) End Cap

Annular Materials

(0.0 to 3.0) Portland Cement with ~ 5% bentonite gel
(3.0 to 5.0) Bentonite chips, 3/8"
(5.0 to 18.0) Sand, 20/40 silica

This boring log should not be used separately from the original report.

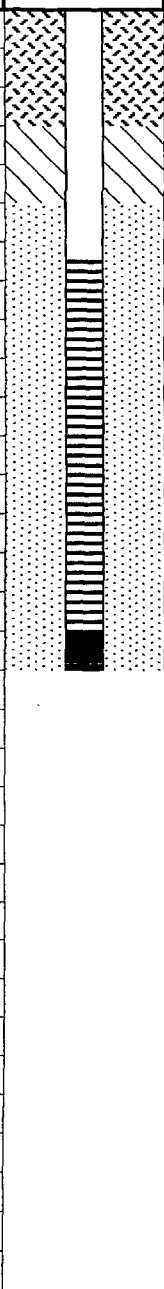
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Log of Boring: NE1MW04

Gulfco Marine Maintenance
Superfund Site
Freeport, TX

Completion Date:	07/21/06	Borehole Diameter (in.):	8.25
Drilling Company:	Best Drilling Services, Inc.	Total Depth (ft):	17
Field Supervisor:	Tim Jennings, P.G.	Northing:	13555097.66
Drilling Method:	Hollow Stem Auger	Easting:	3154385.63
Sampling Method:	5 ft continuous core	Ground Elev. (ft. MSL):	2.1
		TOC Elev. (ft MSL)	4.9

PBW Project No. 1352

Depth (ft)	Well Construction Diagram	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0		19			
		28.2	5/5	CL	(0.0 to 5.0) Sandy CLAY, dark gray to reddish-brown, moist, ~ 10% to 20% fine-grained sand, ~ 80% to 90% medium to low plasticity clay, very stiff.
5		20.9			
		1	5/5		(5.0 to 8.2) Sandy silty CLAY, gray to brown, wet, ~ 20% to 40% fine-grained sand and silt, 60% - 80% medium to high plasticity clay, soft.
		1.1		SM/SC	(8.2 - 10.0) Silty clayey SAND, brown to gray, wet, ~50% high plasticity silt and clay, ~ 50% very fine-grained to fine-grained sand, firm.
10		1.1			
		0.7	4.5/5	CH	(10.0 to 15.0) Silty sandy CLAY, reddish-brown to gray, wet, ~ 20% to 40% silt and very fine-grained sand, ~ 60% to 80% high plasticity clay, very soft, oyster shells at 11.8 to 12.2.
15			2/2	CL	(15.0 to 16.5) Sandy CLAY with carbonate nodules, gray, wet, ~ 30% fine-grained sand, ~ 20% carbonate nodules, ~ 50% medium plasticity clay, very fractured.
					(16.5 to 17.0) Sandy CLAY, brown, moist, ~ 10% fine-sand, ~ 90% low to medium plasticity clay, very stiff, first confining clay.
20					
25					
30					

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Well Materials

(0.0 to 6.5) Casing, 2" sch. 40 PVC
(6.5 to 16.5) Screen, 2" sch. 40 PVC, 0.01 slot
(16.5 to 17.0) End Cap

Annular Materials

(0.0 to 3.0) Portland Cement with ~ 5% bentonite gel
(3.0 to 5.0) Bentonite chips, 3/8"
(5.0 to 17.0) Sand, 20/40 silica

This boring log should not be used separately from the original report.

PASTOR, BEHLING & WHEELER, LLC
Consulting Engineers and Scientists

Log of Boring: SJ1MW15

Gulfco Marine Maintenance
Superfund Site
Freeport, TX

Completion Date:	07/19/06	Borehole Diameter (in.):	8.25
Drilling Company:	Best Drilling Services, Inc.	Total Depth (ft):	25
Field Supervisor:	Tim Jennings, P.G.	Northing:	13554764.11
Drilling Method:	Hollow Stem Auger	Easting:	3155165.2
Sampling Method:	5 ft continuous core	Ground Elev. (ft. MSL):	2.5
		TOC Elev. (ft MSL)	5.61

PBW Project No. 1352

Depth (ft)	Well Construction Diagram	PID (ppm-y)	Recovery (ft/ft)	USCS	Lithologic Description
0		3.4			(0.0 to 1.0) Sandy CLAY, brown, moist, ~ 40% fine to medium-grained sand, ~ 60% low plasticity clay, soft.
		3.9	3/5	CL	
5		5.9			(1.0 to 7.5) Sandy CLAY, reddish-brown to gray, moist, ~ 10% fine-grained sand and silt, ~ 90% medium plasticity clay.
		7.3	4/5		
		6.9			
10		5.9			
		5.5	4.5/5	SP/SM	(7.5 to 20.0) Silty Clayey SAND, brown, moist to wet below 10.0, ~ 20% to 40% high plasticity fines as interbeds, ~ 60% to 80% very fine to fine-grained sand with poorly graded sand interbeds at 11.5 to 12.5 and 13.2 to 15.0, soft.
15		7.3			
		8.4	5/5		
		7.5			
20		5.9			
		9.2	5/5	CH	(20.0 to 23.7) Silty CLAY, gray, moist, high plasticity, firm, first confining clay.
25		10.8		SP	(23.7 to 25.0) Poorly graded SAND, brown, wet, very fine to fine-grained sand, soft, borehole allowed to slough in to 24.0 for well construction.
30					

PBW

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Well Materials

(0.0 to 10.0) Casing, 2" sch. 40 PVC
(10.0 to 20.0) Screen, 2" sch. 40 PVC, 0.01 slot
(20.5 to 20.5) End Cap

Annular Materials

(0.0 to 5.5) Portland Cement with ~ 5% bentonite gel
(5.5 to 7.5) Bentonite chips, 3/8"
(7.5 to 21.0) Sand, 20/40 silica
(21.0 to 24.0) Bentonite chips, 3/8"

This boring log should not be used separately from the original report.

APPENDIX B

SAMPLE HANDLING DETAILS AND ANALYTICAL METHODS FOR PROPOSED NATURAL ATTENUATION SCREENING PARAMETERS

TABLE B-1

PARAMETERS AND METHOD SPECIFICATIONS

MEDIA: GROUNDWATER

Intended Use: Natural attenuation assessment

QC Level: 100% Level II

LABORATORY PARAMETERS	SAMPLING SOP	MEASUREMENT TECHNIQUE	PREPARATION METHOD	ANALYSIS METHOD
CHEMICAL ANALYSES				
Methane, Ethane, Ethene (Dissolved)	PBW SOP-10	GC	NA	RSK 175
Nitrate	PBW SOP-10	Colorimetric	NA	EPA 353.2
Sulfide	PBW SOP-10	Colorimetric	NA	EPA 376.2
Total Organic Carbon	PBW SOP-10	Carbonaceous Analyzer	NA	SW-846 9060

TABLE B-2

SAMPLE CONTAINER, PRESERVATION AND HOLDING TIME REQUIREMENTS

MEDIA: GROUNDWATER

LABORATORY PARAMETERS	CONTAINER	PRESERVATION	HOLDING TIME
Methane, Ethane, Ethene (Dissolved) ⁽¹⁾	G-TLS	HCl to pH < 2 Cool to 4 C	14 days
Nitrate	P, G	Cool to 4 C	48 hours
Sulfide	P, G	NaOH & ZnAC Cool to 4 C	7 days
Total Organic Carbon	P, G	HCl to pH < 2 ⁽²⁾ Cool to 4 C	28 days

P – Polyethylene G – Glass TLC – Teflon®-lined cap TLS – Teflon®-lined septum

Notes:

- (1) Samples shall not contain headspace or air bubbles.
- (2) H₂SO₄ or solid NaHSO₄ are also acceptable preservatives.

TABLE B-4
QUALITY CONTROL OBJECTIVES
MEDIA: GROUNDWATER

ANALYTE	METHOD ⁽¹⁾	TARGET MDL ⁽²⁾ (mg/L)	TARGET MQL ⁽³⁾ (mg/L)	MAX %RSD ⁽⁴⁾	MIN r (Correl. Coeff)	ICV/ CCV ⁽⁵⁾ REC.	BLANK CONC. ⁽⁶⁾	LCS MS/MSD REC. ⁽⁷⁾	ANALYTICAL DUP RPD	FIELD DUP RPD	SU REC. ⁽⁷⁾	IS AREA ⁽⁸⁾
Methane (Dissolved)	RSK 175	0.0015	0.002	20	0.99	+/-15	<MQL	60-140	40	NA	NA	NA
Ethane (Dissolved)	RSK 175	0.0015	0.002	20	0.99	+/-15	<MQL	60-140	40	NA	NA	NA
Ethene (Dissolved)	RSK 175	0.0015	0.002	20	0.99	+/-15	<MQL	60-140	40	NA	NA	NA
Nitrate	EPA 353.2	0.01	0.01	NA	NA	70-130	<MQL	70-130	30	NA	NA	NA
Sulfide	EPA 376.2	0.02	0.02	NA	NA	70-130	<MQL	70-130	30	NA	NA	NA
Total Organic Carbon	9060	1	1	NA	NA	70-130	<MQL	70-130	30	NA	NA	NA

Notes:

- (1) Unless otherwise indicated, analytical methods are from EPA SW-846 "Test Methods for Evaluating Solid Waste."
- (2) Method Detection Limits are determined by the laboratory using the procedures in 40 CFR Part 136, Appendix B. The MDL listed here is the maximum method detection limit that will support the project performance objectives based on the Preliminary Screening Values (PSVs). The laboratory MDL will likely be lower than those listed for most analytes but the target MDL may not be achievable for a few analytes. Additionally, Sample Detection Limits (which are adjusted to reflect sample-specific actions, such as dilution or use of smaller aliquot sizes than prescribed in the analytical method, and take into account sample characteristics, sample preparation, sample cleanup, and analytical adjustments including dry-weight adjustments) will be higher.
- (3) Method Quantitation Limits correspond to the lowest non-zero concentration standard in the laboratory's initial calibration curve calculated using the normal aliquot sizes and final volumes prescribed in the analytical method. The MQL listed here is based on typical laboratory performance. The laboratory MQL may be different. Additionally, Sample Quantitation Limits (which are adjusted to reflect sample-specific actions, such as dilution or use of smaller aliquot sizes than prescribed in the analytical method, and take into account sample characteristics, sample preparation, sample cleanup, and analytical adjustments including dry-weight adjustments) will be higher.
- (4) Per the analytical methods for organics, the %RSD for an individual analyte may exceed the criteria as long as the mean %RSD for all calibrated analytes is within the criteria. For data qualification purposes, the %RSD criteria will be applied to each individual analyte and the data flagged accordingly. For GC/MS analyses, the analytical method also includes criteria for the Relative Response Factor (RRF) for a subset of the calibrated analytes. For data qualification purposes, a minimum RRF criteria of 0.05 will be applied to each individual analyte and the data flagged accordingly.
- (5) Per the analytical methods for organics, the CCV response for an individual analyte may be outside the criteria as long as the mean CCV response for all calibrated analytes is within the criteria. For data qualification purposes, the CCV criteria will be applied to each individual analyte and the data flagged accordingly.
- (6) Criteria apply for all blank types including method blanks, calibration blanks, equipment blanks, and trip blanks. For data qualification purposes, blank concentrations for all positively identified analytes (i.e., above the detection limit) will be assessed and the data flagged accordingly. However, laboratory corrective action is instituted only for concentrations above the quantitation limit.
- (7) Criteria are for data qualification purposes. The laboratory shall monitor performance and institute routine corrective action using the laboratory-established limits.
- (8) Expressed as percent of area for internal standard in midpoint calibration standard.

TABLE B-5 - METHOD SELECTION WORKSHEET - GROUNDWATER

Analytes		Reporting Requirement (Y or N)	Medium	Critical Parameters				Routine Available Methods
Chemicals of Interest	CAS No.			ID Only (ID) or ID Plus Quantitation (ID+Q)	Preliminary Screening Value (PSV)	Target Method Detection Limit	Units	
Methane (Dissolved)	74-82-8	Y	Groundwater	ID+Q	NV	1.50E-03	mg/L	RSK 175
Ethane (Dissolved)	74-84-0	Y	Groundwater	ID+Q	NV	1.50E-03	mg/L	RSK 175
Ethene (Dissolved)	74-85-1	Y	Groundwater	ID+Q	NV	1.50E-03	mg/L	RSK 175
Nitrate	14797-55-8	Y	Groundwater	ID+Q	NV	1.00E-02	mg/L	EPA 353.2
Sulfide	18496-25-8	Y	Groundwater	ID+Q	NV	2.00E-02	mg/L	EPA 376.2
Total Organic Carbon	C-012	Y	Groundwater	ID+Q	NV	1.00E+00	mg/L	SW-846 9060

Notes:

NV - No value established